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(12) **UK Patent Application** (10) **GB** (11) **2 345 511** (13) **A**

(43) Date of A Publication 12.07.2006

(21) Application No 8227331.1

(22) Date of Filing 12.12.1998

(71) Applicant(s)  
 United Utilities PLC  
 (Incorporated in the United Kingdom)  
 Dawson House, Great Sankey, WARRINGTON,  
 WA5 3LW, United Kingdom

(72) Inventor(s)  
 David James Gregson  
 Roy Isbell

(74) Agent and/or Address for Service  
 Marks & Clerk  
 Sussex House, 83-85 Mosley Street, MANCHESTER,  
 M2 3LG, United Kingdom

(51) INT. CL.<sup>7</sup>  
 E02D 29/14

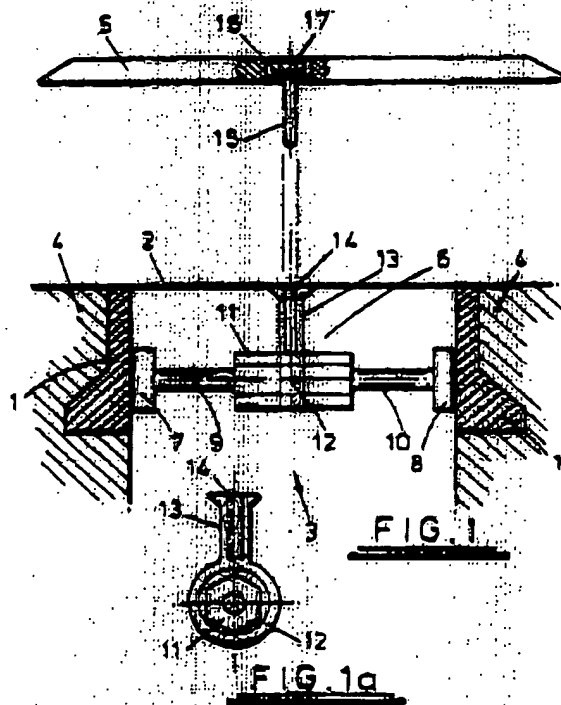
(52) UK CL. (Edition A)  
 E1G G98X

(56) Documents Cited  
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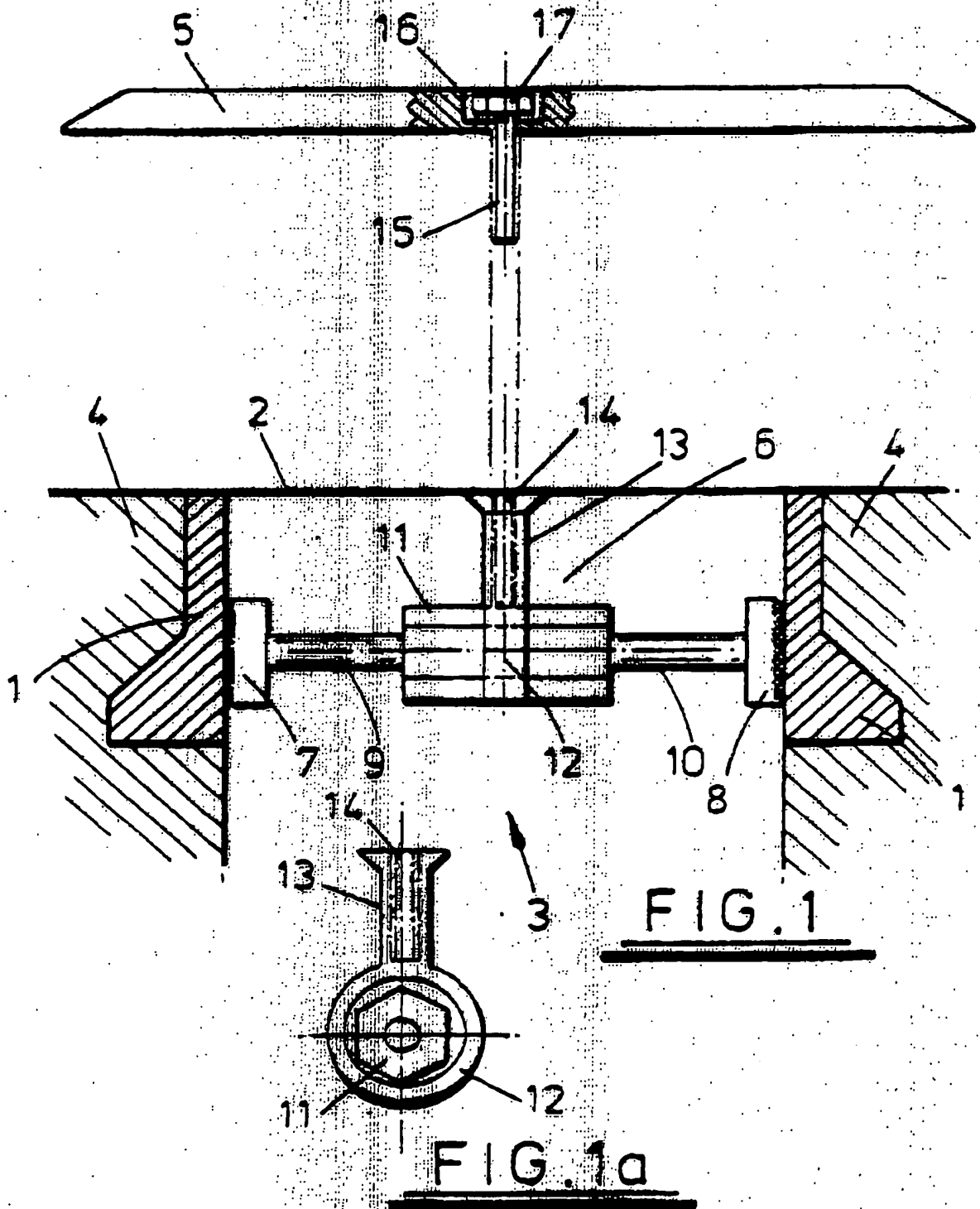
(58) Field of Search  
 UK CL. (Edition A) E1G G98X  
 INT. CL.<sup>7</sup> E02D 29/14  
 Online: WPI EPODOC JAPIO

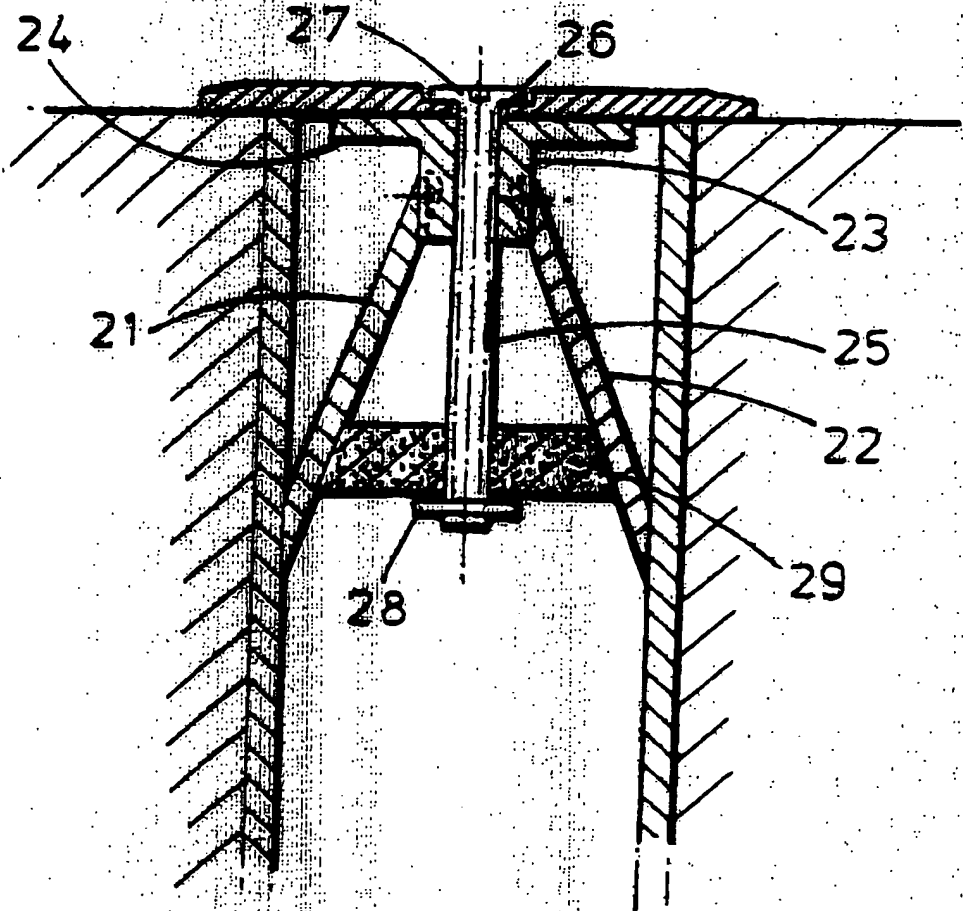
(54) Abstract Title  
**Shaft cover and anchoring assembly**

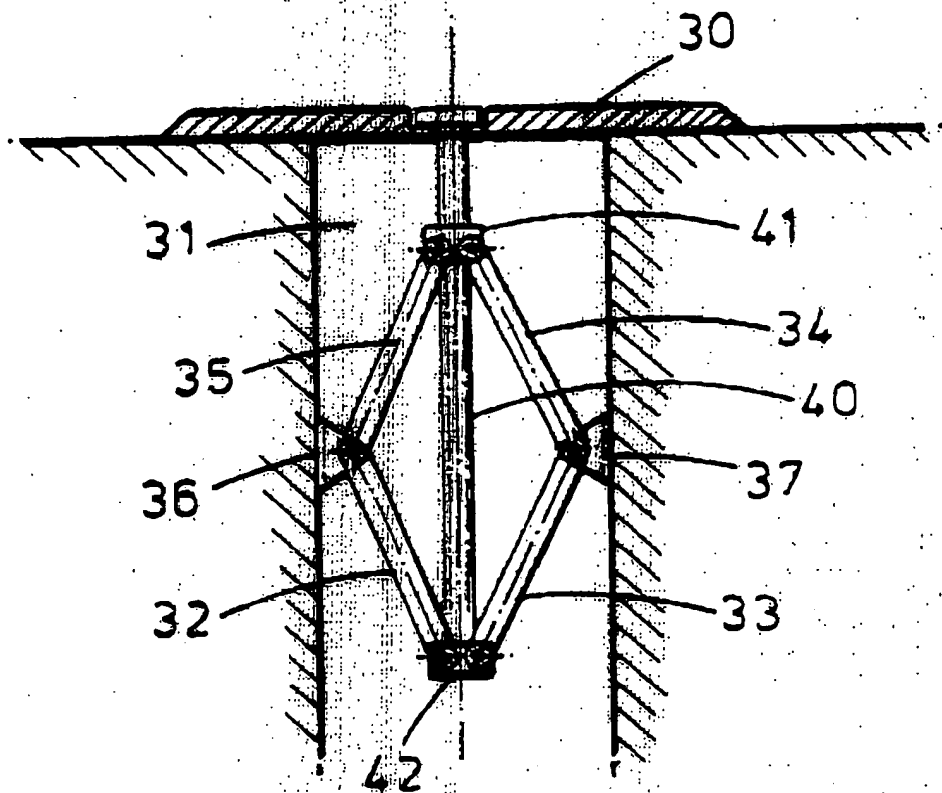
(57) A cover assembly for covering the opening (2) of a shaft (3) comprises a cover plate (5) for covering the opening (2) and an expandable anchor assembly (8) adapted to engage the walls of a box (1) within the shaft and thereby anchoring the cover plate in position. The cover plate (5) overlaps the edge of the shaft opening (2) and is load bearing. The anchor comprises oppositely threaded horizontal shaft engaging arms (9, 10) extending from an expansion nut (11). Rotation of the expansion nut (11) urges the arms outwardly towards opposite walls of the box (1) or retracts inwardly. In a second embodiment (Fig. 2) the anchor arms are pivoted about a central member and are urged upwardly and outwardly by an expansion member mounted on a threaded member which rotates above ground. A third embodiment (Fig. 3) uses a "scissorjack" arrangement.



1/3



2/3FIG. 2

3/3FIG. 3

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### SHAFT COVER ASSEMBLY

The present invention relates to an assembly for covering the opening of a shaft in the ground. Particularly, but not exclusively, the invention relates to a cover assembly designed as a temporary closure for the access shaft of a water or other utility fitting, such as for example a mains water supply stop-tap.

Mains water supply systems include fittings which must be accessed from public places. Many such fittings, such as for instance mains water stop-taps, must be located below ground to reduce the likelihood of freezing. Such fittings are therefore typically located at the bottom of a short shaft the opening of which, at ground level, is closed by a cover. For instance, water stop-tap valve shafts are typically closed by a cast iron cover plate (typically of the order of six inches square) which hinges within a supporting box which is recessed into the shaft opening so that the cover is substantially flush with the ground level to avoid presenting a hazard to pedestrians.

It is highly desirable to replace broken shaft covers as quickly as possible both in view of the hazard presented by the exposed shaft and to prevent unauthorised access. Indeed, in relation to such things as mains water stop-tap shaft covers local authorities in the United Kingdom set a minimum period within which the local water authorities must repair reported broken covers. It is not, however, always possible for the water authority engineers to effect a full and permanent cover repair or replacement in the short times set. This can lead to rudimentary and unsatisfactory temporary measures being taken to seal a shaft opening pending repair by the appropriate water authority. This can add to the difficulty and cost of eventual repair.

It is an object of the present invention to obviate and mitigate the above difficulties.

According to the present invention there is provided a cover assembly for covering the opening of a shaft in the ground, the assembly comprising a cover plate for covering the opening and an expandable anchor assembly adapted to engage the walls of the shaft and thereby anchor the cover plate in position.

The invention provides a cover assembly which can be installed in a shaft without any dependence upon the particular shape of the shaft or size of the shaft (within limits determined by the expansion of the anchor assembly). In particular, the

invention may be embodied as a temporary cover assembly designed for quick and easy installation in an open shaft as a temporary closure for the shaft pending repair or replacement of a more permanent cover. As such, the invention provides for a cover assembly with a largely universal fitting nature.

Preferably the expandable anchor assembly comprises at least two shaft engaging members and means for moving at least one of said shaft engaging members from a retracted position in which the anchor assembly may be inserted into the shaft to an extended position in which the anchor assembly is expanded such that the shaft engaging members engage the wall of the shaft. Alternatively, there may be only one moveable shaft engaging member. For instance, the assembly could comprise two shaft engaging members only one of which is moveable to achieve said expansion.

The cover assembly (which may be releasably securable to the anchor assembly) is preferably dimensioned relative to the anchor assembly so that it will span the opening of any shaft within which the anchor assembly is installed and seat upon the ground around the shaft opening. This will thereby ensure that the cover plate is the load bearing member of the assembly (in terms of load supplied downwards upon the anchor assembly), the anchor assembly having only to provide a secure means of fixing the cover plate in position. In addition a cover plate of a single shape will be able to cover a smaller opening of any shape and does not need to match the shape of the shaft opening. The cover plate may be of any desired shape such as for instance circular or rectangular.

Specific embodiments of the present invention will now be described, by way of example, with reference to the accompanying drawings, in which:

Figure 1 illustrates a first embodiment of the present invention;

Figure 1a is a cross-section through a part of the embodiment of Figure 1;

Figure 2 illustrates a second embodiment of the present invention; and

Figure 3 is a schematic illustration of a third embodiment of the present invention.

Referring to Figure 1, the illustrated cover plate assembly in accordance with the invention is shown fitted within a box-sectioned housing 1 of a conventional water mains stop-tap cover which is fitted into the opening 2 of a shaft 3. Normally a cast iron cover plate (not shown) would be hingedly mounted within the box-section

housing 1 to lie flush with the surface of the surrounding ground 4. The illustrated embodiment of the invention is designed to take the place of a damaged cover plate as a temporary measure pending repair or replacement of the permanent cover plate.

The illustrated cover plate assembly comprises a cover plate 5 and an anchor assembly 6 to which the cover plate 5 is in use secured.

The anchor assembly comprises two gripper blocks 7 and 8 which are mounted to the ends of respective threaded arms 9 and 10 which extend laterally from opposite ends of an expansion nut 11. The arms 9 and 10 are oppositely threaded so that rotation of the expansion nut 11 (whilst the arms 9 and 10 are held against rotation) either drives the arms 9 and 10 outwardly in opposing directions or retracts them into the expansion nut 11, depending upon the direction of rotation of the nut 11.

The anchor assembly 6 further comprises a cover plate mounting member which has an annular collar portion 12 which is slidably located around the expansion nut 11 and which supports a radially extending shank 13. The shank 13 is provided with a screw threaded bore 14 to receive the shaft 15 of a bolt which is used to secure the cover plate 5 to the anchor assembly 6.

In use, the expansion nut 11 is rotated to retract the arms 9 and 10 sufficiently to allow the anchor assembly 6 to be inserted into the box 1. The expansion nut 11 is then rotated in the opposite direction to drive the arms 9 and 10 outwards until the gripping blocks 7 and 8 contact the walls of the box 1. Initially, it may be necessary to manually hold the arms 9 and 10 against rotation, but once the gripping blocks 7 and 8 have contacted the walls of the box 1 this should not be necessary. A suitable tool may be used to rotate the expansion nut 11 until the anchor assembly 6 is firmly anchored in position.

The cover plate mounting member is then rotated so that the shank 13 extends upwards so that the cover plate 5 may be secured in position by screwing the bolt 15 into the bore 14 of the shank 13. The cover plate 5 is provided with a recess 16 to receive the bolt head 17 so that it does not project from the surface of the cover plate 5 which might otherwise present a hazard.

Once secured in position, the cover plate 5 lies flat on the ground 4 overlying the edges of the shaft 3 and box 1. The cover plate 5 is therefore the weight-bearing part of the assembly, there is no need for the anchor assembly 6 to bear weight rather



it simply provides a firm anchor for securing the cover plate 5 in position. If desired, the bolt 15 can be a security bolt to prevent tampering and unauthorised removal of the cover plate assembly.

The cover plate 5 may be centred relative to the opening 2 by sliding the member 12 along the length of the expansion nut 11 before the bolt 13 is tightened. Also, alignment marks may be provided on the arms 9 and 10 to indicate their length of projection from the expansion nut 11 so that they may be arranged to project by equal amounts.

Installation and removal of the cover plate assembly are both extremely straight forward operations requiring no specialised skill, and can be performed by a single person in a very short period of time.

It will be appreciated that the illustrated cover plate assembly is not limited to installation within a box-sectioned housing of the type illustrated. Rather, the gripping blocks may bear against any appropriate surfaces, such as the walls of the shaft. Furthermore, the surfaces against which the gripping blocks bear need not be regular.

It will also be appreciated that within limits determined by the maximum and minimum lengths of extension of the arms 9 and 10 the cover plate assembly can be fitted to a range of different sized and configured shafts or openings. Similarly, since the cover plate 5 is secured to the anchor assembly 6 it does not need to be configured differently for different situations. In particular the size and shape of the cover plate does not need to match the size and shape of the shaft opening or any cover it replaces. All that is required to close the opening completely is that the cover plate is big enough to span the opening. For instance a circular cover plate could cover a rectangular opening and vice versa. Thus, within the aforementioned limits, the cover plate assembly has a universal nature.

Referring now to Figure 2, the illustrated second embodiment of the invention is shown fitted within a shaft 18. As with the embodiment of Figure 1, the cover plate assembly comprises a load bearing cover plate 19 which is secured to an anchor assembly 20. The cover plate 19 may be substantially the same as the cover plate 5 of the first embodiment of the invention but the anchor assembly 20 is of a completely different design. In this case the anchor assembly 20 comprises two arms 21 and 22

ach of which is pivotally secured at one end to a substantially cylindrical support member 23. The cylindrical support member 23 is provided with an annular flange 24 which provides a contact surface for the load bearing plate 19. The cover plate 19 is fixed to the anchor assembly 20 by a threaded bar 25 which extends through a recessed aperture 26 in the cover plate 19, through the support member 23, and down between the arms 21 and 22. The top end of the bar 25 is provided with a flange 27 which is received in the recessed opening 26 of the cover plate 19 and the bottom end of the bar 25 is received within a nut 28. A screw-threaded frustoconical expander member 29 is mounted on the bar 25 and bears against the arms 21 and 22. The expander member cannot rotate relative to the arms 21 and 22.

The arrangement is such that rotation of the bar 28 causes the expander 29 to behave as a "captive nut" and move up or down along the length of the bar 25 depending on the direction of rotation. As the expander member 29 moves upwardly along the bar 25, the arms 21 and 22 are forced outwards whereas as the expander 29 moves down the shaft the arms 21 and 22 pivot freely inwards.

In use, the assembly is inserted into the opening of the shaft 18 so that the cover plate 19 rests on the ground and the arms 21 and 22 hang free of the walls of the shaft 18. The bar 25 is then rotated to draw the expander member 29 upwards and force the arms 21 and 22 outwards into contact with the shaft 18. This is continued until the assembly is firmly anchored in position.

It will be appreciated that the second embodiment of the invention is also an essentially universal fitting and thus has the advantages of the first embodiment of the invention described above.

Figure 3 schematically illustrates a further alternative embodiment of the invention. Here again, the cover plate assembly comprises a cover plate 30 which is secured to an anchor assembly 31. In this instance, the anchor assembly 31 is of a "scissor-jack" arrangement comprising four links 32, 33, 34 and 35 pivotally connected in a parallelogram arrangement. Gripping members 36 and 37 are mounted to opposing pivotal joints 38 and 39 whereas a screw threaded bar 40 extends vertically between the other two pivotal joints 41 and 42 and also attaches the cover plate 30 to the anchor assembly 31. The bar 40 turns in a bearing at pivot joint 42 and co-operates with a threaded collar at pivot joint 41 such that by rotation of the bar 40

the gripper members 36 and 37 are either driven outwards or retracted inwards depending upon the direction of rotation of the bar 40. Operation of the device in use is very similar to that of the embodiment of Figure 2. Once again, the cover plate assembly is of a universal character and can be used in a variety of different sized and shaped shafts and openings. The load bearing capability is provided by the cover plate the anchor assembly serving only to hold the plate in position.

the gripper members 36 and 37 are either driven outwards or retracted inwards depending upon the direction of rotation of the bar 40. Operation of the device in use is very similar to that of the embodiment of Figure 2. Once again, the cover plate assembly is of a universal character and can be used in a variety of different sized and shaped shafts and openings. The load bearing capability is provided by the cover plate the anchor assembly serving only to hold the plate in position.

## CLAIMS

1. A cover assembly for covering the opening of a shaft in the ground, the assembly comprising a cover plate for covering the opening and an expandable anchor assembly adapted to engage the walls of the shaft and thereby anchor the cover plate in position.
2. A cover assembly according to claim 1, wherein the expandable anchor assembly comprises at least one shaft engaging portion which is moveable between retracted and extended positions whereby in use the moveable shaft engaging portion may be initially retracted to enable the anchor assembly to be inserted into the shaft and subsequently extended into engagement with the shaft.
3. A cover assembly according to claim 1 or claim 2, wherein the expandable anchor assembly comprises at least two shaft engaging members and means for moving at least one of said shaft engaging members from a retracted position in which the anchor assembly may be inserted into the shaft and an extended position in which the anchor assembly is expanded such that the shaft engaging members engage the wall of the shaft.
4. A cover assembly according to claim 3, wherein both of said at least two shaft engaging members are moveable in opposing directions.
5. A cover member according to claim 3 or claim 4, wherein the or each moveable shaft engaging member comprises an arm mounted for pivotal and/or translational movement whereby in use one end of the arm may be moved into engagement with the shaft.
6. A cover assembly according to claim 5, wherein said at least one arm is in screw threaded co-operation with an arm support member such that relative rotation between said arm and said arm support member extends or retracts said arm by a screwing action which thereby comprises said moving means.

7. A cover assembly according to claim 6, wherein the anchor assembly comprises two such screw threaded arms each received in the opposite end of an expansion nut such that rotation of the expansion nut relative to the arms causes said arms to simultaneously extend or retract in opposing directions.

8. A cover assembly according to claim 6 and claim 7, wherein said cover plate is in use secured to the arm support member.

9. A cover assembly according to claim 8, wherein the cover plate assembly is secured to said arm support member by a linking member which is moveable relative to the support member to adjust the position and/or orientation of the cover plate relative to the anchor assembly.

10. A cover assembly according to claim 4 or claim 5, wherein each of said at least two arms is pivotally mounted at one end thereof to a support member such that the arms extend at an acute angle to each other, and wherein said moving means operates to pivot the arms such that the other end of each arm is moved in opposing directions away from one another.

11. A cover assembly according to claim 10, wherein said cover plate and said arms are connected to a common support member.

12. A cover assembly according to claim 10 or claim 11, wherein said moving means comprises an expander member and means for moving said expander member towards the pivotal mounting location of said arms to thereby spread said arms.

13. A cover assembly according to claim 12, wherein the expander member is mounted on a screw threaded bar which extends between the arms, the expander member being caused to move along the length of the bar by rotation of the bar.

14. A cover assembly according to claim 13, wherein said bar extends through said cover plate and said support member thereby securing said cover plate to said support member.

15. A cover assembly according to any one of claims 1 to 4, wherein the anchor assembly comprises a "scissor-jack" arrangement of at least four pivotally connected links, two opposing joints of which provide said shaft engaging members.

16. A cover assembly according to claim 15, wherein expansion and contraction of the anchor assembly is enabled by rotation of a bar which also serves to secure the cover plate to the anchor assembly.

17. A cover assembly according to any preceding claim, wherein the cover plate is adapted to span the opening and thereby comprise the load bearing part of the assembly.

18. A cover assembly according to any preceding claim, wherein the cover plate is realisablely securable to the anchor assembly.

19. A cover assembly for closing the opening of a shaft in the ground, substantially as hereinbefore described, with reference to the accompanying drawings.



INVENTOR IN PEOPLE

Application No: GB 9827331.1  
 Claims searched: 1-19

Examiner: Barnaby Wright  
 Date of search: 3 May 2000

# Patents Act 1977 Search Report under Section 17

## Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.R): E1G

Int Cl (Ed.7): E02D (29/14)

Other: Online: EPODOC, WPI, JAPRO

## Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
X	GB 2,308,147 A COX See fig 2, and page 3, in 14-27, and page 5, in 20-27, and page 7, in 3-19, and page 8, in 9-12.	1-9, 17, 18
X	GB 2,299,602 A BRITISH GAS See whole document especially fig 5, and page 3, paragraph 3.	1-3, 17, 18
X	GB 1,249,914 BURGESS See whole document.	1-3, 17, 18
X	US 4,101,154 KAGSTROM See especially fig 2, and col 1, in 39-56, and col 3, in 8-25.	1-5, 10, 11, 17, 18

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